What is claimed is:

1
~~49~~. In a process for producing a product using a material which is electrochemically loaded with an isotopic fuel, a method of controlling the loading which includes in combination:
supplying said isotopic fuel to said material,
providing means for loading said isotopic fuel into said material to saturate said material,
then providing means for producing a change in the active quantity of said isotopic fuel within said material,
creating thereby a catastrophic diffusion flux of said isotopic fuel within said material.

2 1
~~50~~. A method as in claim ~~49~~ wherein said material is a member of the group consisting of palladium, Groups IVb, Vb, and rare earth elements.

3 1
~~51~~. A method as in claim ~~49~~ wherein said second material is a member of the group consisting of deuterium or deuterons.

4
~~52~~. In a process using an isotopic fuel loaded into a material, a two-stage method for controlling the loading which includes in combination:
supplying said isotopic fuel to said material,
providing means for loading said isotopic fuel into said material to saturate said material,
then providing means for producing a change in the active quantity of said isotopic fuel within said material,
creating thereby a catastrophic diffusion flux of said isotopic fuel within said material.

5 4
~~53~~. A method as in claim ~~52~~ wherein said material is a member of the group consisting of palladium, Groups IVb, Vb, and rare earth elements.

6 4
~~54~~. A method as in claim ~~52~~ wherein said second material is a member of the group consisting of deuterium or deuterons.

7 4
~~55~~. A method as in claim ~~52~~, where the material is loaded electrochemically.

8 4
~~56~~. A method as in claim ~~52~~, where the said means to produce a change in the active quantity of said isotopic fuel within said material is by a change in temperature of said material.

9 4
~~57~~. A method as in claim ~~52~~, where the additional step is taken of obstructing the diffusion flux of said fuel by a diffusion barrier located within said material.

10 4
~~58~~. A method as in claim ~~52~~, where the additional step is taken of removing said product produced.

11 10
~~59~~. A method as in claim ~~58~~ wherein said product is heat and said means of removing heat utilizes a member of the group of high thermal conducting devices, including a thermal pipe, a diamond filament, and a polymer filled with diamonds.

12 10
~~60~~. A method as in claim ~~58~~ wherein said means of removing said product utilizes an applied magnetic field.

13
~~61~~. An apparatus to produce a product using a material loaded with an isotopic fuel, which includes in combination:
means to supply said isotopic fuel to said material,
means to load said isotopic fuel into said material to saturate said material,
means to produce a change in the active quantity of said isotopic fuel within said material,
means thereby to produce a catastrophic diffusion flux of said isotopic fuel within said material.

14 13
~~62~~. An apparatus as in claim ~~61~~ wherein the isotopic fuel is a member of the group consisting of deuterium or deuterons.

15 13
~~63~~. An apparatus as in claim ~~61~~ wherein said said material is a member of the group consisting of palladium, Groups IVb, Vb, and rare earth elements.

64. An apparatus as in claim 61 wherein said means to load said isotopic fuel into said material is electrochemical.

65. An apparatus as in claim 61 wherein additional means are provided to obstruct the diffusion flux of said isotopic fuel by a diffusion barrier located within said material.

66. An apparatus as in claim 65 wherein said diffusion barriers are multiple and are arranged as alternating layers of diffusion barriers.

67. An apparatus as in claim 61 wherein the means produce a change in the active quantity of said isotopic fuel within said material is by a change in temperature.

68. An apparatus as in claim 61 which includes a high modulus incompressible structural barrier surrounding said material filled with said isotopic fuel.